SCIENCE.—SUPPLEMENT.

FRIDAY, FEBRUARY 12, 1886.

PRIMITIVE MARRIAGE.

PROF. W. ROBERTSON SMITH, in his 'Kinship and marriage in early Arabia' (Cambridge, *University press*, 1885), may be regarded as having given the latest contribution to the controversy going on between those who uphold the opinions of the late Lewis H. Morgan in regard to the origin of human society and the primitive form of marriage, and those who support the views of the late John F. McLennan upon these subjects. To explain fully in what these differences consist would require too much space, so that we must content ourselves with stating some of the main points of disagreement.

Mr. Morgan, in his 'Ancient society,' maintained that the primitive family, which succeeded to a condition of promiscuous intercourse, was a consanguine one, founded on the intermarriage of brothers and sisters in a group. This was followed by the Punaluan or Hawaiian family, in which several sisters or brothers had groups of husbands or wives in common, who were not necessarily of kin. From this sprung the Malayan system of relationship, in which all blood-relations fall under the heads either of parent and child, of grandparent and grandchild, or of brother and sister. Besides these, the relations by marriage were also recognized. In course of time a second system of relationship grew up, the Turanian, and the form found on this continent, to which he has given the name of the Ganowanian. This second system was based upon Punaluan marriage, accompanied by a division of the tribe into gentes. The gens comprised all those who have sprung from the same mother, and intermarriage in it was prohibited. The Turanian system of relationship included, in addition to the terms used in the Malayan, also words for uncle, aunt, nephew, niece, and cousin; and it recognized also the connections by marriage. The Malayan and the Turanian systems are called by Morgan classificatory, as distinguished from that in use among ourselves, which he calls the descriptive system.

Mr. McLennan, on the other hand, in his 'Primitive marriage,' criticised this view of the origin of the classificatory systems very severely as 'utterly unscientific,' and argued that such a system cannot be one of blood-ties at all, but that it is merely a mode of addressing persons. In it the terms 'son' and 'daughter' do not imply descent from the same mother or father, and the relationship of the child to its mother is completely ignored. The phenomena presented by such a system he undertook to explain as having originated from what he believed to be the oldest form of marriage, that of Nair polyandry, by which several unrelated men have a wife in common. This custom arose from the practice, in the earliest times, of female infanticide on account of the difficulty of subsistence. Thus a scarcity of women was occasioned, from which originated the general habit of procuring wives by capture from neighboring hostile tribes. From this custom sprung the usage of exogamy, by which intermarriage within the tribe was prohibited. Under Nair polyandry the only idea of blood-relationship conceivable would be through females, as the uncertainty of fatherhood would prevent the acknowledgment of kinship through males. Gradually there was developed a higher form of polyandry, the Thibetan, by which several brothers have a wife in common. The recognition of kinship through males having thus become possible, an explanation of the terms used in the classificatory system is not far to seek.

To this criticism and explanation Mr. Morgan replied by denying the general prevalence of either Nair or Thibetan polygamy, or of exogamy as a tribal custom, which he insisted was restricted to the gentes within the tribe. He argued, that, in the archaic form of the gens, descent was limited to the female line, and that this is what is really meant by McLennan's 'kinship through females only;' and he insisted that McLennan's hypothesis is utterly insufficient to account for the origin of the classificatory system, while ridiculing the idea that this could be a system of addresses instead of a system of consanguinity and affinity.

The discussion was now taken up by Messrs. Fison and Howitt in 'Kamilaroi and Kurnai,' a work upon the organization and primitive marriage customs of certain Australian tribes, and in a review of 'Primitive marriage' by Mr. Fison, in the *Popular science monthly* for June, 1880; in both of which Morgan's views were stoutly and elaborately maintained.

Shortly after, Mr. John McLennan having died, his brother Donald continued the discussion, on his side, by a review of 'Kamilaroi and Kurnai' in *Nature*, April 21, 1881, in which he attempted to refute Mr. Fison's objections to his brother's opin-

ions, and endeavored to prove that the former's views were based upon incorrect information. The argument was continued by his publication last year of a supplementary volume, based upon his late brother's papers, entitled 'The patriarchal theory,' written in opposition to the views upon this subject of Sir Henry Maine. In the preface he states that his brother had intended to present in greater detail the proofs of his theory of the origin of exogamy. He believed that it grew out of the system called 'totemism,' which had been outlined by him in three essays on 'The worship of animals and plants,' published in the *Fortnightly review* in 1869–70. From totemism came exogamy, arising from the scarcity of women; and this must have originated in societies acknowledging no kinship except through women. From this condition there has been a gradual progress by evolution, with varying degrees of rapidity among different people, but involving the recognition of kinship through males. As bearing upon the question of the scarcity of women, the late Mr. McLennan had already made a large collection of instances of the prevalence of infanticide and kindred practices.

Such being the present state of the controversy, as we said at the outset, the volume now before us, upon 'Kinship and marriage in early Arabia,' must be regarded as the last contribution to it. It upholds in the most uncompromising fashion the McLennan side. The learned author of the celebrated lectures upon 'The Old Testament and the Jewish Church' and upon 'The prophets of Israel,' in the discharge of his duties as lord-almoner's professor of Arabic in the University of Cambridge, had occasion to study thoroughly the laws of marriage and of tribal organization which prevailed in Arabia at the time of Mohammed. He became fully satisfied that the system of male kinship there had been preceded by one of kinship through women only, and that changes in the tribal system went hand in hand with the change in the system of kinship. He is also convinced that the correspondence of the Arabian facts with this general theory proves that the system of totemism and the law of exogamy once prevailed among the Arabs, and that the general principles of the hypothesis laid down by McLennan in 'Primitive marriage' cannot be shaken. The results thus derived he believes have "a very important bearing on the most fundamental problems of Arabian history, and on the genesis of Islam itself." All who are interested in the history of the early institutions of mankind must welcome such a learned and novel explanation of the primitive type of Semitic religion, and of the consequences that have flowed from it.

The opinion has generally prevailed that the deities of the primitive tribes must be identified with the heavenly bodies; but our author proves that this was not the earliest form of tribal religion. The Arabs retained a tribal constitution longer than the other Semites, and we know much more about it than about that of any other tribe. In its primitive form it was a totem tribe; that is, one in which the belief that all its members are of one blood was associated with the religious conviction that the life of the tribe was in some mysterious way derived from some animal or plant. "There is reason to think," he remarks, "that in early times totem tribesmen generally bore on their bodies a mark of their totem, and that this is the true explanation not only of tattooing, but of the many strange deformations of the teeth, skull, and the like, which savages inflict on themselves and their children" (p. 187). So he would explain the 'mark' set on Cain by Jehovah as "the tribal mark, which every man bore on his person, and without which the ancient form of blood-feud, as the affair of the whole stock, however scattered, and not of near relatives alone, could hardly have been worked" (p. 216). The most important evidence of the feeling, involved in the totem religion, that a man's totem animal is of one race with himself, is derived from the doctrine of forbidden foods. "A prohibition to eat the flesh of an animal of a certain species, that has its ground, not in natural loathing, but in religious horror and reverence, implies that something divine is ascribed to every animal of the species. And what seems to us to be natural loathing often turns out, in the case of primitive peoples, to be based on a religious *taboo*, and to have its origin, not in feelings of contemptuous disgust, but of reverential dread. . . . Unclean animals, whom it was pollution to eat, were simply holy animals" (p. 307). Many of their most ancient tribal names are taken from animals, of which our author gives an explanatory list of more than thirty. Such names the genealogists usually seek to explain as derived from an eponymous ancestor. But the history of paternity among the Arabs makes it clear that ancient stock-names were not derived from fathers; for the system of stocks was in existence, and they must have had names, long before the idea of fatherhood had been developed.

Three forms of marriage were known among the Arabs in antiquity: *Mot'a marriage*, which was a temporary arrangement for a fixed time; *Beena marriage*, a development of the system of Nair polyandry, where the husband settled among the wife's kindred; and *Baal marriage*, which was probably unknown before the Semitic dispersion, in which the husband took the wife to his own home,

becoming her 'lord and master.' The first kind was common at the time of Mohammed, and was with difficulty, if at all, abolished by him. Under it, as well as under Beena marriage, kinship could have been reckoned only through females. Before Baal marriage was established, a kind of Thibetan polyandry had prevailed, which he calls Baal polyandry, in which the husbands were all of one stock. From this arose the habit of acknowledging kinship through males. This Baal polyandry had grown out of the custom of marriage by capture, which was older than that of marriage by purchase, and continued after the latter custom had sprung up. In Baal marriage, of course, whether constituted by capture or by contract, the children would be regarded as belonging to the blood of the father.

We regret that we cannot allude to many other important subjects, especially that of the prohibited degrees, from which useful light may be derived upon the problems of early kinship, as well as to numerous excursuses in the notes upon interesting archeological topics. We can only refer general students of early society, as well as all who are interested in old Arabia, to this valuable work, which, having been expanded and rewritten from a course of university lectures delivered in 1885, contains the last word in the important controversy of which we have attempted to sketch the outline. H. W. H.

THE OIL-WELLS OF BAKU.

BAKU is a seaport town of the Apsheron peninsula, in the Caspian Sea, in the most southern part of the Russian territory. The adjacent region has long attracted the attention of the surrounding nations, on account of the naphtha with which the soil is impregnated. The inflammable gases issuing from the ground rendered the locality sacred in the eyes of the Parsees, or fire-worshippers, who have long resorted to it from distant places. The peninsula is an arid waste; and one of the most serious difficulties encountered is the scarcity of water, both for mechanical and dietetic uses. The centre of the oil-industry, according to F. Vasilieff, as given in the Proceedings of the Institution of civil engineers, does not exceed four and a half square miles in area, which forms, indeed, the centre of the whole oil-bearing region of the Caucasus.

The earliest oil-wells date back for centuries. A Persian inscription has been found which fixes the date of one of them at 1594. After the cession of the country to the Russians in 1813, the oil-industry was under the control of the government, and up to 1873 the entire revenue derived from this source did not exceed fifty thousand dollars. The manufacture of kerosene commenced in 1858, after which the industry began to develop slowly; but within the last fifteen years it has increased with greater activity. At that time land was sold at auction, and brought as high as five thousand dollars per acre. The old crude methods and shallow wells were abandoned, and at present there are more than five hundred borings. The yield has now reached a million tons per annum.

The naphtha-bearing strata, three of which are so far known, belong to the lower miocene formation. They dip at an angle of from 20° to 40°, and are composed of sand, calcareous clays, marls, and in places compact sandstone, often of great thickness. Organic remains are wholly absent. The naphtha-bearing sands are in a semi-fluid condition, and, when brought to the surface, give off carburetted-hydrogen gas. Not only do these sands give much trouble, but the salt water associated with them makes the driving of bore-wells difficult.

The plateau is a hundred and forty feet above the surface of the Caspian Sea, and the bores reach as deep as six or seven hundred feet. The depth, however, depends upon the yield and the quality of the oil. At first the oil does not reach high in the borings; but, as the depth increases, it rises, and at last is forced out by the pent-up gases.

A naphtha-fountain differs very much from one of water. The oil, on leaving the pipe, is broken up into many jets, which scatter in all directions. The larger part, on account of the liberation of the occluded gases, is shattered into the finest spray. Together with the oil, there is ejected an immense quantity of sand, stones, lumps of clay, some of the pieces being very large. This condition of things is explained by the high pressure of the gases, which has been measured in closed bore-pipes, and found to range between fifty and three hundred pounds per square inch. In the year 1883 two fountains played simultaneously to a height of between two hundred and fifty and three hundred and fifty feet. When a fountain breaks out, the boarding of the boring-turret is soon torn off, stones are thrown up to a great height, and it is dangerous to approach the bore, especially from the circumstance that the naphtha spray has an inebriating effect on the workmen. A cloud of naphtha hovers over the fountain, and is carried to great distances by the winds, covering every thing it passes over with a light film of oil. The sand thrown up forms a hillock round the well, often rising to twenty-eight feet in height. The bursting-forth of a fountain is accompanied by loud noises and a trembling of the earth. Millions

of tons of oil have been lost from an inability to direct it into reservoirs, which are frequently not even prepared before the need of them arises. Some fountains are intermittent, and play from one to two or three hours at a time, and then cease for a day or so. These are the most convenient, as they give plenty of time to arrange for collecting the oil. In some cases the action has to be started by withdrawing a few scoops of oil from the bore, and thus disturbing the subterranean equilibrium.

Continuous fountains sooner or later become intermittent, and then, like the latter, settle down into ordinary wells, from which the oil must be raised by the usual methods. The jet sent out of a bore-pipe appears urged forward by a rapid succession of pulsations; but periods of quiet may be noted, during which the fountain seems to gather up its strength for an extra energetic effort. The height of the jet varies with the intensity of the pulsations. A continuous fountain may yield over thirty-three hundred tons of oil, and require the labor of a hundred men to collect and store it in reservoirs. The daily yield would be worth five hundred dollars, the cost of labor being from seventy-five to a hundred dollars.

The condition of the oil is such, that, when no longer forced out by internal agencies, it must be removed from the bores by means of scoops: hence the bore-holes have to be large, usually sixteen inches in diameter, and, having to be maintained at that diameter throughout, must be lined with bore-pipes. The cost of these bore-pipes is a serious item, in a well of six hundred feet in depth costing twenty-five hundred dollars, while the expense of sinking the bore amounts to about five thousand dollars.

The owners of allotments are free to sink their bore-holes where they like: hence they are mostly sunk along the boundaries of the plots, and not at the points which the lay of the strata would indicate to be the most advantageous. The reason for this is, that each proprietor considers, that by sinking a bore near his neighbor's plot, if he succeed, he will get his own oil and a good deal of his neighbor's also. His neighbor is actuated by the same motives: hence the allotments have the appearance of fortified places, being surrounded by works, and unoccupied over the greater portion of their inner areas. Naturally, if a bore be exceptionally successful, a large number of additional ones are at once driven, and the yield of each is in consequence reduced.

The mean produce of the one hundred wells now in action is given at thirty-two tons per well per day, from March to November. The average cost of production is about twelve dollars per ton, nearly five per cent of which is due to the scarcity of water.

A commission appointed by the government reports that a pipe-line from Baku to Batoum on the Black Sea is indispensable for the higher development of this industry, as at present not one-half of the valuable products are obtainable. The commission, however, thinks that the undertaking should be left to private enterprise. The Transcaucasian railway will in a measure aid in the transportation.

RATIO OF INCREASE OF HEIGHT TO INCREASE OF BULK IN THE CHILD.

Some remarkable observations, we learn from the *Lancet*, have been recently made by the Rev. Malling Hansen, principal of the Danish institution for the deaf and dumb, on the progressive increase in height and weight of children, one hundred and thirty of whom were under his charge. Of these, seventy-two were boys and fifty-eight girls, and they were weighed in batches of twenty, four times daily, — in the morning, before dinner, after dinner, and at bed-time. Each child was measured once a day. The weighings and measurements extended over a period of three years, and the results showed that the increase in the bulk and height of the body does not proceed at a uniform rate throughout the year. Three distinct periods, with some minor variations, were observed. In regard to bulk, the maximum period extends from August until December; the period of equipoise lasts from December until about the middle of April; and then follows the minimum period until August. In regard to height, the maximum period corresponds to the minimum period of increase in bulk. In September and October a child grows only a fifth of what it did in June and July. So it appears that during the autumn and the beginning of winter the child accumulates bulk, but the height is stationary. In the early summer, on the other hand, the bulk remains nearly unchanged, but the vital force and nourishment are expended to the benefit of height. When the body works for bulk, there is rest for growth, and *vice versa*. Mr. Hansen has observed a similar ratio of increase of bulk to increase of height in trees. In regard to the minor variations observed, it is probable that they are dependent, in part at least, upon the external temperature; so that, when this runs up, there is marked increase in weight, while a diminution of weight occurs with a fall of temperature.

Mr. Hansen's observations are undoubtedly of considerable importance. Similar ones have been

made by Dr. W. R. Miller, surgeon to the West Riding convict prison. Dr. Miller experimented on about four thousand prisoners for thirteen years, and obtained results that differ sensibly from those of Mr. Hansen; for he found that the season of maximum increase in weight in adults is from April to August, and the period of minimum increase in adults from September to March. Dr. Miller found the body became heavier in summer, and lighter in winter; and he attributes the loss of weight to the more active excretion of carbonic-acid gas in the colder months.

DIFFERENT PHYSIOLOGICAL SENSES FOR HEAT AND COLD.

IN connection with the researches of Professor Hall and Dr. Donaldson of Johns Hopkins university, recently given in *Mind*, it will be of interest to state that Mr. A. Herzen has lately published in the *Archiv für physiologie*[1] the results of a series of experiments showing that the physiological sense of cold is different from that of heat. His attention was first directed to the subject by a simple incident, the verification of which may be readily made by any observer. Awakening one night, he found one of his arms lying without the bed-clothes, 'alseep;' in touching it with the other hand, he perceived a distinct sensibility to warmth, while that of touch was gone. Bringing his arm, however, in contact with cold substances, he was surprised to find no sensation.

Pursuing the subject further, he produced artificially this condition of semi-paralysis by the compression of nerve-trunks, and by experimentation discovered that the sensibility to cold remained a short time after tactile impressions had disappeared, and that the sensibility to warmth remained much longer, but not quite as long as the power of detecting pain; also that the impressions of warmth require more time for transmission to the brain than those of cold, bearing, in fact, the same relations to each other as the sense of pain does to that of cold. These results were further supplemented by observations on a person with complete and permanent tactile anaesthesia of the legs, but in whom the sense of pain remained normal. The subject was able to distinguish quite well the differences in temperature between 150° F. and 81° F., which was the normal temperature of the surface of the leg. Below the latter temperature, however, no sensation was produced, not even by the contact of ice on the inner side of the thigh. Other cases showed the same peculiarities, in which, with the disappearance of tactile sensibility, the susceptibility to cold was also lost, while that to warmth yet remained.

Vivisection experiments upon cats and dogs lead the author to the following conclusions: 1. The so-called sense of heat and cold is composed in reality of two senses quite independent both anatomically and physiologically; 2. Observations on healthy and diseased subjects show that the sensations of heat and cold are transmitted through different nerves, by different routes, and to different brain-centres; 3. The gyrus sigmoideus contains the centre (or the centripetal branches leading thereto) of touch and cold perceptions; 4. These sense-perceptions are transmitted through the posterior columns of the spinal cord, while those of the senses of pain and warmth are conveyed through the gray substance.

Although the senses of cold and touch on the one hand, and heat and pain on the other, seem to be more nearly related, yet one cannot unite them, or consider the different perceptibilities of heat and cold mere modifications of those of touch and heat. The researches of Blix and others have demonstrated the existence of separated, isolated, irregularly distributed points upon the body, of which one may be only sensible to cold, another to warmth, and a third to touch. Doubtless most persons have noticed the different degrees of susceptibility of different parts of the body to heat and cold: the author points out striking examples of such.

[1] *Ueber die spaltung des temperatursinnes in zwei gesonderte sinne*, XXXVIII. p. 98, December, 1885.

RAINFALL IN SOUTH AFRICA.[1]

LITTLE has been known until recently on the subject of rainfall in South Africa, taken broadly over the whole country, although observers have for many years been keeping records at isolated stations. There has been for many years a meteorological commission in existence at Cape Town; and in the report for 1883 an interesting table was published, giving the means, monthly and yearly, at all stations where records have been kept for at least five years, with the altitude above sea-level, and the latitude and longitude for each station.

From these data Mr. Tripp has prepared a map of South Africa, with the idea of showing the distribution of the total yearly rainfall. The curves divide the area into districts, where the mean yearly rainfall is—

(1)	Under	5	inches.			
(2)	From	5	"	to	10	inches.
(3)	"	10	"	"	20	"
(4)	"	20	"	"	30	"
(5)	Above	30	"			

There are doubtless, particularly along the moun-

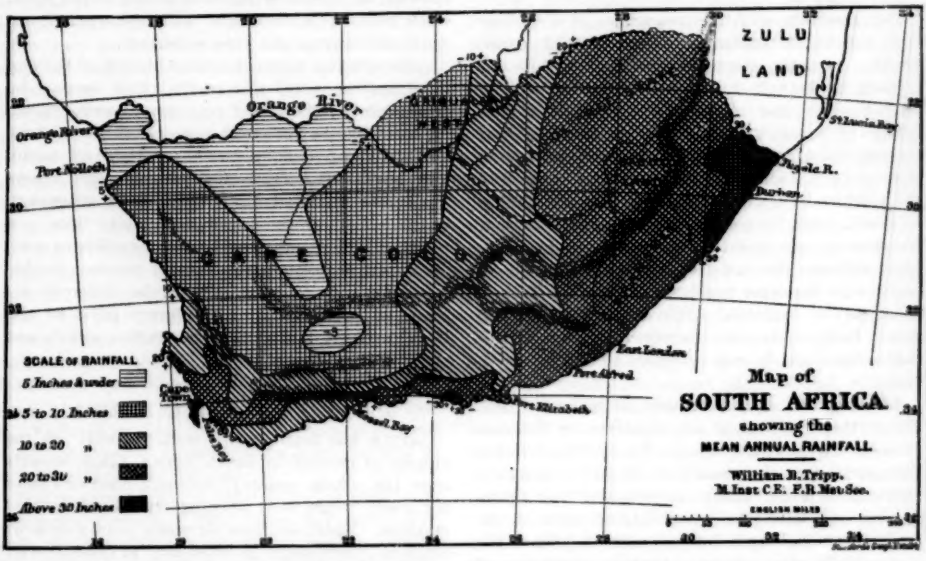
[1] Abstract of an article by William B. Tripp, in *Symons's meteorological magazine*.

tain ranges, many wet strips and spots where no definite records are kept, and which therefore cannot at present be shown on the map. Multiplication of records, as well as general local knowledge, will, no doubt, reveal many such places.

South Africa may be described as a central tableland, rising in successive terraces from the seacoast. The country has been subject to great erosion from water; and the mountains with which the country is studded, and the deep valleys, locally termed 'kloofs,' with which it is intersected, are principally due to this cause. In some cases the hills are covered with forests, but generally they are now denuded of such covering. Where the streams take their rise in an area denuded of forest, their volumes are highly variable, their beds being dry for, in some cases, three hundred days in the year; their only existence being, in fact, as torrents after sudden thunder-storms. When, however, it fortunately happens that the streams take their rise in an area still largely clothed with forests, they are frequently perennial.

The climate over such a large tract of country as South Africa varies, of course, considerably. The rainfall varies from 2 inches to 50 or 60 inches doubtless, and perhaps more in some of the mountain districts: in the north-west corner of Natal it is considerably over 30 inches. Dividing the country according to the half-yearly distribution of rainfall, we find that on the western and southern sides the fall is generally greater in the winter half of the year from April to September, than in the summer half from October to March; May, June, and July being the wettest months, and the north-west the general rain-bearing wind. On the eastern side, however, the fall is greater in the summer half, March and February being the wettest months, and the south-east the rain-bearing wind. On the south-east coast the dividing-line between these two different characteristics appears to run out to sea very nearly at Port Alfred, where the fall in both halves of the year appears to be very nearly identical, that in the summer half being rather the greater of the two.

Mr. Tripp resided and kept records for some



years at King William's Town, in the eastern province, where, on a total of 283 days, from June, 1880, to May, 1883, 70 inches of rain were registered, 30.25 inches of which (recorded on 242 days) were made up of falls under 0.50 of an inch, 19.88 inches (on 28 days) from 0.50 of an inch to 1 inch, and 19.87 inches (on 13 days) of falls of from 1 inch or upwards, in twenty-four hours. The heaviest fall on any one day was 2.04 inches, and the next heaviest fall was 3.11 inches, in forty-eight hours.

Although this record proves that the rains are moderate and tolerably distributed, and do not all occur in sudden storms, yet the author has heard accounts of sudden falls there of a very different character, and most disastrous in their results.

FACSIMILE OF THE ANTILEGOMENA.

THE Johns Hopkins publication agency announces a reproduction in phototype of seventeen pages of a Syriac manuscript containing the epistles known as 'Antilegomena.' These are to be published under the editorial supervision of Prof. Isaac H. Hall, Ph.D., with brief descriptive notes by the editor. This manuscript consists of the Acts and Catholic epistles, and the Pauline epistles, followed by Hebrews; together with tables to find Easter, etc. (arranged for the Seleucid era), tables of ecclesiastical lessons, and a poem at the end, giving a history of the genesis of the manuscript. Its chief peculiarity consists in its containing seven Catholic epistles, while ordinary Syriac manuscripts have but three; 2 Peter, 2 and 3 John, and Jude being commonly rejected by the Syrians, and very rarely found among them. The version is Peshitto, except for these commonly rejected epistles, in which is followed the version usually printed. Each book, except the several Catholic epistles (and they as a whole), has its proemium from Gregory Bar Hebraeus, and its title and subscription. The manuscript is provided throughout with the Syrian sections and church lessons, and is dated at the end. Grammatical and other annotations occur frequently in the margins. The careful writing and pointing, as well as the superior character of the text, with the matters narrated in the poem at the end, show the work to be that of a critical Syrian scholar, and not of a mere copyist. Two notes by the contemporary corrector appear on leaves toward the end. The printed editions of the rejected epistles all rest on one inferior Bodleian manuscript, and particularly upon its *editio princeps*, published by Edward Pococke (Leyden, *Elzevir*) in 1630. This has hitherto been varied in later editions only by editorial conjecture. This is the second manuscript of these epistles ever given to the public, and doubles the available critical material, though a few other manuscripts of various ages are known to exist, some copied from the printed editions. The selected pages are: 1. A page containing the end of one of the tables of lessons, with a contemporary Arabic note respecting the origin and character of the manuscript; 2. The first page of Acts, with title and proemium, showing the general appearance and external characteristics of the manuscript; 3. The leaves which contain the Antilegomena matter, — 2 Peter, 2 and 3 John, and Jude (with them, of course, the end of 1 Peter, 1 John, and the beginning of Romans, with general proemium to the Pauline epistles and that to Romans); 4. The last page of the manuscript proper, end and subscription to Hebrews, and date of manuscript, with note of contemporary corrector; 5. Two pages containing the poem above referred to; in all, seventeen phototype pages, each on a separate leaf, besides additional pages containing appropriate descriptive and explanatory matter.

EDUCATIONAL BOOKS AND REPORTS.

A BATCH of educational pamphlets has been accumulating on our table, and we believe that a reference to their contents will be of interest to the readers of *Science*.

In the beautifully printed parchment series of Keagan Paul & Co., Lord Iddesleigh (Sir S. Northcote) has given a complete report of the entertaining lecture which he delivered as the first of a series of addresses to the students of the University of Edinburgh, Nov. 3, 1885. He discusses desultory reading, its pleasures, dangers, and uses. The theme is not new, but after Maurice, and Carlyle, and Lowell, and Emerson, and many more who have recorded their experience, these fresh statements on 'the friendship of books' are well worth reading. They suggested to the London *Spectator* of Jan. 2 a racy editorial, quite worth perusal.

The former cabinet-minister, Rt. Hon. G. J. Goschen, M.P., has collected seven of his addresses on educational and economical themes. That upon the cultivation of the imagination was reprinted long ago in Littell. The second, on mental training and useful knowledge, points out the danger of science-teaching; namely, that the teachers will endeavor to impart facts rather than to set the scholar thinking. The third, higher education for workingmen, is an explanation of the purposes of the London society for the extension of university teaching, and an endeavor to awaken a love of study among bread-winners. The lecture is most encouraging in its account of the success of popular concerts and lectures in London. The rest of the volume relates to economics.

The University of Cambridge has published the report of a syndicate on popular lectures, written by Rev. W. M. Ede of St. John's college. It reviews the work of the university extension scheme, and points out the obstacles which that work has encountered, and the danger of its degenerating into a mere lecturing scheme. The tone of the report is encouraging, and its frank exhibition of the conditions of failure and of success makes it suggestive to Americans who are endeavoring by like methods to carry instruction to those classes in the community who are at hard work during many hours each day.

This is the period when most of the reports ap-

pear which are given to the public on the part of universities and colleges. Among those which have reached us, that of Columbia college may first be named, which is dated as far back as May 5. President Barnard discusses the working of the elective system, and says that the study which has commanded the preference of the largest number in the classes where there is freedom of choice is Greek, while mathematics commands the preference of the smaller number. It should be borne in mind that this refers to the academical or classical department, not to the School of mines, where those young men are most likely to go who are adverse to Greek and inclined to mathematics. Of those electing, one-half elect French, one-third German, and one-seventh Spanish. The library, which a short time ago was forty-seventh in magnitude among collections in the United States, is now twentieth, and connected with it there is a school for the education of librarians. The School of mines, in its new accommodations, is more useful than ever, but the tendency to overwork is so strong that the faculty are considering important modifications of the courses.

President Walker, of the Massachusetts institute of technology, shows that the number of students has increased from 302 in 1881–82, to 609 in 1885–86, — a truly wonderful advance. They come from thirty-three states, and their average age is eighteen years and two months. He exhibits the value of the system of receiving young men as 'special students,' — a practice which elsewhere has led to inconveniences and difficulties.

In the University of Michigan, President Angell expresses regret that there are less students than formerly from homes without that state, and justly says that the institution will suffer if its cosmopolitan character is lost. He strongly commends the working of the elective system, and makes a vigorous, and we hope an irresistible, appeal for continued liberality in the development of the university.

The annual report of the University of California is prepared by the secretary of the regents, J. H. C. Bonté; and while it contains all the information which can be desired, and much more than is commonly given, it indicates the lack of a coordinating mind. The new president, Prof. E. S. Holden, entered upon his duties after the report was issued, and the result of his oversight will be seen a year hence. The report indicates great generosity in the endowment of the university. Its funds for general purposes amount to $1,678,386, besides the site, the buildings, and certain property not yet available, estimated at more than a million of dollars. In addition to all this, there is the great Lick gift, for an observatory, and smaller endowments for medicine and law.

The full reports of Governor Stanford's gift indicate that his purposes are by no means so definite as were at first supposed, and it may be hoped that his mind is still open for suggestions which will tend toward important modifications in the original instrument.

Col. H. B. Sprague, late of Boston, has become president of Mills college for women, in California, and his inaugural address is a glowing review of the various subjects which tend to constitute a liberal education.

NEW BOOKS.

'Household economy,' published under the direction of the Kitchen garden association (New York, *Ivison, Blakeman, Taylor & Co.*), is intended to supply a want long felt by almost every class of society, that of a clear, concise, and systematic text-book on those duties which "always have claimed, and probably always will claim, the main thought and time of the vast majority of women." —— 'Food-materials and their adulterations,' by Ellen H. Richards (Boston, *Estes & Lauriat*), is a little work intended for the intelligent housewife. The author disclaims novelty or originality. In some places the work is too technical for the readers whom the author would reach, and, as in the analysis of milk, some errors have slipped in; nevertheless the work will serve a very useful purpose, containing as it does a description of the principal food-materials and their adulterations, and at times hints on their culinary preparation. —— 'Nature's teaching,' by J. G. Wood (Boston, *Roberts*), is designed "to show the close connection between nature and human inventions, and that there is scarcely an invention of man that has not its prototype in nature." The author has there grouped a long series of parallels under the heads 'Nautical,' 'War and hunting,' 'Architecture,' 'Tools,' 'Optics,' 'Useful arts,' and 'Acoustics.' But often the merest resemblance of some natural growth to some human contrivance causes their association, when one has but the remotest connection with, or suggestiveness toward, the other. —— 'A handbook to the national museum at Washington' (New York, *Brentano brothers*) will be a useful guide to the extensive scientific collections of the national museum now on exhibition. It is interspersed with a large number of engravings, mostly good, which, together with the numerous explanatory notes, will give the work an independent value. It was prepared by Mr. Ernest Ingersoll, whose pleasant literary style is well known.